

[Time: Three Hours]

[Marks:70]

Please check whether you have got the right question paper.

- N.B: 1. All questions are compulsory.
2. Draw neat labelled diagrams whenever necessary.

- Q.1** a) Give the structure, Properties and significance of liquid Crystals. (03)
b) Define Specific rotation and give its application in pharmacy. (02)
c) What is the freezing point of a solution containing 3.42gm of sucrose and 500gm of water? The molecular weight of sucrose is 342. In this relatively dilute solution, value of $K_f = 1.86$ (03)
d) Define the following: (04)
i) Isothermal process
ii) Adiabatic Process
iii) Isobaric Process
iv) Isochoric Process
e) Discuss the variation of equivalent conductance with dilution. (03)
- Q.2** a) Explain the principle and method of liquefaction of gases by Claude's method. (04)
OR
Explain the Principle behind liquefaction of gases and write a note on aerosols.
b) Define dipole moment. How can it be used in elucidation of molecular Structure? (03)
c) i) State and explain Kirchoff's equation. (04)
ii) Write a short note on-Bond Energy.
- Q.3** a) Justify – 'Relative lowering of vapor pressure is a colligative property'. (04)
b) Define entropy and write its significance. Calculate the increase in entropy when one gram molecular weight of ice at 0°C melts to form water. Latent heat of fusion of ice = 80 calories. (04)
OR
Give the various statements of second law of thermodynamics and discuss efficiency of heat engine.
c) What is the effect of dilution of a weak electrolyte on specific and equivalent conductance? (03)
- Q.4** a) Discuss critical Phenomenon and define various critical constants. (04)
b) Define molar refraction. Discuss applications of Abbe's refractometer. (03)
c) Describe any one method to determine depression in freezing point as a colligative property. (04)
OR
Explain a method to determine the molecular weight of a solute by elevation in boiling point.

- Q.5**
- a) Write a short note on polymorphism. (04)
 - b) What is osmosis? Explain Berkley and Hartley's method for measurement of osmotic pressure. (04)
 - c) Define : Heat of fusion (03)
Heat of combustion
Heat of solution

OR

Explain Hess's law of constant heat summation.

- Q.6.**
- a) Calculate the pressure of 1 mole of CO₂ gas in a container of 2 liter capacity at 27°C using the ideal gas equation and Van der Waal's equation. (03)
a = 3.608 lit² atm/mole²
b = 0.0428 lit/mole
R = 0.0821 lit atm/K mole
 - b) Write a note on Azeotropic distillation. (03)
 - c) Write a note on Gibb's free energy (03)
 - d) State the postulates of Arrhenius theory of electrolytic dissociation. (02)